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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,510	11/14/2003	Janice H. Nickel	200308744-1	9969

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EXAMINER

HO, TU TU V

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 11/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/713,510	NICKEL ET AL.	
	Examiner	Art Unit	
	Tu-Tu Ho	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2003 and 18 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 31-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 31-38 is/are rejected.
- 7) ☒ Claim(s) 11 and 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11/14/2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Oath/Declaration

1. The oath/declaration filed on 11/14/2003 is acceptable.

Election/ Restriction

2. Applicant's election without traverse of Invention I, **claims 1-15 and 31-38**, and cancellation of Invention II, claims 16-30, in the reply filed on 10/18/2004 is acknowledged.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "sensor" of **claim 3** must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement

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Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. **Claims 11 and 12** are objected to because of the following informalities: Each of claims 11 and 12 recites: “The device of claim 6 wherein the magnetic memory element” which lacks an antecedent basis. It is clear that the “magnetic memory element” is cited in claim 7. Therefore, amend the phrase to ““The device of claim 7 wherein the magnetic memory element”.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 1, 4-6, 10, and 14-15** are rejected under 35 U.S.C. 102(b) as being anticipated by Chiang et al. U.S. Patent 6,339,544 (hereinafter referred to as the ‘544 patent).

The '544 patent discloses in Figures 1-14, particularly Fig. 14, and respective portions of the specification a thin film device as claimed.

Referring to **claim 1**, the '544 patent discloses a thin film device comprising:

at least one patterned thin film layer (290);

a heater material (250) coupled to at least one of the patterned thin film layers for providing thermal assistance thereto (Abstract, paragraph bridging columns 8 and 9 and the paragraph that follows); and

a conductor (230) coupled to the heater material to supply energy to the heater material.

Referring to **claim 4**, Fig. 14 of the '544 patent further shows that the at least one patterned thin film layer (290) is formed on the heater material.

Referring to **claim 5**, Figs. 10 and 14 of the '544 patent further shows that the conductor (230) is a split conductor (230a and 230b, column 6, lines 21-30 and last paragraph of column 6) and the heater material is connected between the split conductor.

Referring to **claim 10**, the '544 patent further discloses that the conductor comprises a conductive sidewall material comprising Al. (column 6, lines 21-30).

Referring to **claim 14**, the '544 patent further discloses that the conductive side wall material is coupled to a power source (paragraph bridging columns 8 and 9 and the paragraph that follows).

Referring to **claim 15**, the '544 patent further disclose a decoder (column 3, lines 65-67), and although not explicitly disclosed, the conductive side wall material is coupled to the power source via the decoder (as the conductive side wall material is coupled to the addressing signal lines 150, 315 as depicted in fig. 14 and as cited above, and considering that the addressing

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signal lines must be coupled to the decoder as is known in the art, the conductive side wall material is coupled to the power source via the decoder).

Referring to **claim 6**, as noted above, the heater material 250 receives power through split conductor 230 through addressing signal lines 150, 315, and through a decoder. In other words, the heater material 250 receives power from the addressing signals, and since addressing signals having frequency in the radio frequency spectrum as is known in the art, it follows that the energy comprise radio frequency energy.

6. **Claims 1, 3, 5, 10, and 14** are rejected under 35 U.S.C. 102(b) as being anticipated by Hamann et al. U.S. Patent 6,233,206 (hereinafter referred to as the '206 patent).

The '206 patent discloses in Figures 1 and 5C and respective portions of the specification a thin film device (10) as claimed.

Referring to **claim 1**, the '206 patent discloses a thin film device comprising:

at least one patterned thin film layer (12, recording media);

a heater material (center film of Fig. 5C) coupled to at least one of the patterned thin film layers for providing thermal assistance thereto (column 3, lines 9-17); and

a conductor (outer film of Fig. 5C) coupled to the heater material to supply energy to the heater material (as evident by the terms "current" and "resistive heating").

Referring to **claim 3**, Fig. 1 further depicts a sensor (100), thus the thin film device (10), comprising various thin film components, comprises a sensor.

Referring to **claim 5**, Figs. 5C further shows that the conductor (the outer film) is a split conductor (the outer film split into two outer films, “split” is interpreted broadly) and the heater material (center film) is connected between the split conductor.

Referring to **claim 10**, the ‘206 patent further discloses that the conductor comprises a conductive sidewall material comprising Cu (Fig. 5C and column 6, lines 59-62, and note that “sidewall” is interpreted broadly).

Referring to **claim 14**, although not disclosed, the conductive side wall material must be coupled to a power source (for “current” to flow).

7. **Claims 1, 2, 7, 11, 12, and 38** are rejected under 35 U.S.C. 102(b) as being anticipated by Abraham et al. U.S. Patent 6,385,082 (hereinafter referred to as the ‘082 patent).

The ‘082 patent discloses in Figures 1 and 5 and respective portions of the specification a thin film device as claimed.

Referring to **claim 1**, the ‘082 patent discloses a thin film device comprising:

at least one patterned thin film layer (51);

a heater material (generally represented by cell 50 and powered by voltage source 54, and “material” is interpreted broadly) coupled to at least one of the patterned thin film layers for providing thermal assistance thereto (column 5, lines 50-55 and column 7, lines 7-20); and

a conductor (2/5) coupled to the heater material to supply energy to the heater material.

Referring to independent **claim 38** and dependent **claims 2, 6, and 12**, and using the same reference characters and citations as detailed above, the ‘082 patent discloses a magnetic random access memory (MRAM) device comprising:

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a plurality of magnetic memory elements (50);
a heater material coupled to at least one of the plurality of magnetic memory elements;
a decoder (not shown but must be present for word line 2 and bit line 5 to function)
coupled to the heater material; and

a radio frequency power source (54, "pulse", and that addressing signals having frequency in the radio frequency spectrum as is known in the art) coupled to the decoder for providing heat to the heater material to thermally assist in switching a magnetic orientation (of the free layer 51) of the at least one of the plurality of magnetic memory elements.

Referring to **claim 7**, as noted above, the '082 patent discloses that the at least one patterned thin film layer comprises a magnetic memory element (MRAM).

Referring to **claim 11**, the '082 patent further discloses that the magnetic memory element comprises at least a spin dependent tunnel junction ("MTJ").

8. **Claims 1, 2, 6-7, 11-13, and 38** are rejected under 35 U.S.C. 102(b) as being anticipated by Leuschner U.S. Patent 6,704,220 (hereinafter referred to as the '220 patent).

The '220 patent discloses in Figures 1-7, particularly Fig. 7, and respective portions of the specification a thin film device as claimed.

Referring to **claim 1**, the '220 patent discloses a thin film device comprising:
at least one patterned thin film layer (16/18/24);
a heater material (26) coupled to at least one of the patterned thin film layers for providing thermal assistance thereto (column 7, lines 38-56); and
a conductor (22) coupled to the heater material to supply energy to the heater material.

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Referring to independent **claim 38** and dependent **claims 2, 6, and 12**, and using the same reference characters and citations as detailed above, the '220 patent discloses a magnetic random access memory (MRAM) device comprising:

a plurality of magnetic memory elements (Fig. 1);

a heater material coupled to at least one of the plurality of magnetic memory elements;

a decoder (not shown but must be present for word line 22 and bit line 12 to function) coupled to the heater material (26); and

a radio frequency power source (addressing signals having frequency in the radio frequency spectrum as is known in the art) coupled to the decoder for providing heat to the heater material to thermally assist in switching a magnetic orientation (of the free layer 24) of the at least one of the plurality of magnetic memory elements.

Referring to **claim 7**, as noted above, the '220 patent discloses that the at least one patterned thin film layer comprises a magnetic memory element (MRAM).

Referring to **claim 11**, the '220 patent further discloses that the magnetic memory element comprises at least a spin dependent tunnel junction ("MTJ").

Referring to **claim 13**, the '220 patent further discloses that the at least one patterned thin film layer (16/18/24) is formed over a dielectric material (30/36, and "material" is interpreted broadly, similarly to "film", which is a term one in the art would use to indicate a single layer film or a multi-layer film) and the dielectric material (30/36) is in contact with the heater material (26).

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9. **Claims 1, 2, 4, 7-9, and 11-12** are rejected under 35 U.S.C. 102(e) as being anticipated by Abraham et al. U.S. Patent 6,724,674 (hereinafter referred to as the '674 patent).

The '674 patent discloses in Figures 1 and 5's and respective portions of the specification a thin film device as claimed.

Referring to **claim 1**, the '674 patent discloses a thin film device comprising:

at least one patterned thin film layer (50);

a heater material (56) coupled to at least one of the patterned thin film layers for providing thermal assistance thereto (column 6, lines 10-28 and column 5, last paragraph); and

a conductor (2/54) coupled to the heater material to supply energy to the heater material (column 6, lines 20-36).

Referring to **claim 2**, the '674 patent further discloses that the thin film device comprises a magnetic-random access memory ("MRAM") device.

Referring to **claim 7**, the '674 patent discloses that the at least one patterned thin film layer comprises a magnetic memory element (MRAM).

Referring to **claim 11**, the '674 patent further discloses that the magnetic memory element comprises at least a spin dependent tunnel junction ("MTJ").

Referring to **claim 12**, the '674 patent further discloses that the magnetic memory element includes a free layer (51) and the heater material provides thermal assistance in switching a magnetic orientation of the free layer (column 6, lines 10-28 and column 5, last paragraph).

Referring to **claim 4**, Fig. 5 of the '674 patent further shows that the at least one patterned thin film layer (50) is formed on the heater material (56).

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Referring to **claim 8**, the '674 patent further discloses that the heater material comprises amorphous silicon (column 6, lines 18-20, as material silicon is not disclosed as being polycrystalline, it is suitably considered amorphous).

Referring to **claim 9**, the '674 patent further discloses that the heater material comprises a metal (column 6, lines 18-20, aluminum).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. **Claims 31 and 32** are rejected under 35 U.S.C. §103(a) as being unpatentable over the '082 patent.

Referring to **claim 31**, the '082 patent discloses an MRAM device as claimed and as detailed above, but fails to teach that the MRAM could be used in a computer system. However, since it is known in the art that MRAMs are to be used in a computer system of sorts and since the '082 has not preclude such a use, it is conceivable and of an obvious nature that the '082 patent's MRAM could be used in a computer system. If the '082 patent's MRAM is used in a computer system, then a processor and an interface would be inherent, and the MRAM would be coupled to the interface, which in turn would be coupled to the processor.

Referring to **claim 32**, the '082 patent further discloses that each of the plurality of magnetic memory elements comprises a spin dependent tunneling junction ("MTJ").

11. **Claims 31 and 32** are rejected under 35 U.S.C. §103(a) as being unpatentable over the '674 patent.

Referring to **claim 31**, the '674 patent discloses an MRAM device as claimed and as detailed above, but fails to teach that the MRAM could be used in a computer system. However, since it is known in the art that MRAMs are to be used in a computer system of sorts and since the '082 has not preclude such a use (though the reference vaguely mentions that the inventive MRAM could be used in an integrated circuit), it is conceivable and of an obvious nature that the '082 patent's MRAM could be used in a computer system. If the '674 patent's MRAM is used in a computer system, then a processor and an interface would be inherent, and the MRAM would be coupled to the interface, which in turn would be coupled to the processor.

Referring to **claim 32**, the '674 patent further discloses that each of the plurality of magnetic memory elements comprises a spin dependent tunneling junction ("MTJ").

Referring to **claim 33**, Figs. 1 and 5 of the '674 patent further shows that each of the plurality of magnetic memory elements is formed on the heater material (56).

Referring to **claim 35**, the '674 patent further discloses that the heater material comprises amorphous silicon (column 6, lines 18-20, as material silicon is not disclosed as being polycrystalline, it is suitably considered amorphous).

12. **Claim 34** is rejected under 35 U.S.C. §103(a) as being unpatentable over the '674 patent as applied above and further in view of Hamann et al. U.S. Patent 6,702,186 (hereinafter referred to as the '186 patent).

The '674 patent discloses a thermally-assisted MRAM device as claimed and as detailed above, and as to be used in a computer system as detailed above, including the heater material 56 comprising amorphous silicon instead of comprising amorphous carbon as claimed. Hamann in the '186 patent, in disclosing also a thermally-assisted memory device similar to the '206 patent detailed above, teaches that suitable material for heating plate and the heat source comprises tungsten and/or carbon because of its resistance and high melting point (column 7, lines 25-31). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the '674 patent' heater material comprising carbon. One would have been motivated to make such a modification in view of the teachings in the '186 patent that carbon is a suitable material for the heater material because of its resistance and high melting point, and since the carbon material is not disclosed as being crystalline, it is considered amorphous.

13. **Claims 36-37** are rejected under 35 U.S.C. §103(a) as being unpatentable over the '674 patent as applied above and further in view of Lowrey et al. U.S. Patent 6,764,897 (hereinafter referred to as the '897 patent).

The '674 patent discloses a thermally-assisted MRAM device as claimed and as detailed above, and as to be used in a computer system as detailed above, including the heater material 56 coupled to conductive material 2 and an optional conductive material 54. The '674 patent further discloses that other configurations for the conductive material are possible (column 6, lines 20-36). However, the reference fails to disclose that the conductive material is a conductive sidewall material as claimed. The '897 patent, in disclosing also a thermally-assisted memory device comprising memory element 250 on heater material "R1", which is coupled to conductive

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sidewall material 530 (Fig. 5B among others) teaches in the paragraph bridging columns 8 and 9 that the use of a specially designed "multi-region" conductive sidewall spacer as an electrical contact as well as the unique positioning of the conductive spacer relative to the memory material provides for more efficient heating of the memory material as well as for more efficient use of the total energy supplied to the memory element.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the '674 patent's conductive material, which as cited above could take various configurations, using a conductive sidewall material as claimed. One would have been motivated to make such a modification in view of the teachings by the '897 patent that the use of a conductive sidewall spacer as an electrical contact provides for more efficient heating of the memory material as well as for more efficient use of the total energy supplied to the memory element.

Referring to the limitation copper or aluminum as a material for the conductive sidewall material, although the '674 patent only discloses metal (column 6, lines 30-32), it is known in the art that copper or aluminum are common conductive materials, therefore selecting these materials would have been within the ordinary skill of one in the art and therefore would have been obvious.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tu-Tu Ho
November 08, 2004